having the appearance of being broken off transversely at a distance of 3° or 4° from the head, the inclination of the following division differing by about 2° from the direction of the longitudinal axis of that preceding. That this separation was taking place at a very rapid rate is shown by the negative of Professor BARNARD of that same evening, and preceding that of the writer by a mean of $3^h\ 0^m$, wherein the separation is shown very decidedly but only about 0°.3 wide, as against 0°.5 in the later negative.

Such a phenomenon was naturally the cause of much anticipatory interest in the results of the following evening, but by that time (according to a negative by Professor BARNARD) the tail had apparently completely coalesced, and from then on there is nothing recorded of unusual interest.

It may further be mentioned that prints from all pairs of negatives taken by Professor BARNARD and the writer, when properly matched, give perfect stereoscopic effect when so viewed, the comet hanging suspended considerably in front of the stars, and the structure of the tail clearly showing. Lack of space prevents the reproduction here of such a print.

All negatives were made upon Seed 27 gilt-edge plates, backed, reduced with hydrochinon liberally restrained with bromide, carefully shielded from the dark-room light, and developed until the appearance of chemical fog indicated the maximum effect.

YERKES OBSERVATORY, September 25, 1903.

PLANETARY PHENOMENA FOR NOVEMBER AND DECEMBER, 1903.

BY MALCOLM MCNEILL.

PHASES OF THE MOON, PACIFIC TIME.

Full Moon,	Nov.	4,	$9^h\ 27^m$ P.M.	Full Moon,	Dec.	4,	$10^h\ 13^m$ A.M.
Last Quarter,	"	11,	6 46 P.M.	Last Quarter,	"	11,	2 53 A.M.
New Moon,	"	18,	9 10 P.M.	New Moon,	"	18,	1 26 P.M.
First Quarter,	"	26,	9 37 P.M.	First Quarter,	"	26,	6 22 P.M.

The Sun reaches the winter solstice and winter begins December 22d, 4 P.M., Pacific time.

Mercury is a morning star at the beginning of November, having passed greatest west elongation about a fortnight be-

fore. It rises about an hour before the Sun, and may possibly be seen under good condition of weather; but it begins to approach the Sun quite rapidly, and comes to superior conjunction on November 21st. It can therefore be seen as a morning star for only a very few days. After conjunction it swings slowly away from the Sun, as an evening star, and toward the close of December it is well out toward greatest east elongation. On December 31st it remains above the horizon an hour and a half after sunset, and for a week or so earlier the interval is more than an hour. The conditions for visibility are fairly good for the last week of December.

Venus is in fine position for observation as a morning star. It is still bright enough at the beginning of November to be seen by the naked eye in full daylight, and on November 28th it reaches its greatest west elongation, 46° 46′ from the Sun. It then rises four hours before sunrise; and at the beginning of November and the end of December the interval is only half an hour less. It moves about 60° eastward and southward among the stars, from the eastern part of *Leo* through *Virgo* and *Libra* nearly to *Scorpio*. *Venus* is in perihelion on December 11th, but, on account of the almost perfect circularity of its orbit, the variation in distance from the Sun is very small.

Mars is still an evening star in the western sky after sunset. Throughout November and December it remains above the horizon about three hours after sunset, and the interval changes only a few minutes in the two months. During this time the Sun gains about 15° on the planet in their common eastward motion; but during December the planet runs northward more than the Sun, and this keeps the interval between the setting of the Sun and of the planet about the same. *Mars* moves about 49° eastward and 7° northward among the stars, from the western part of *Sagittarius* to the eastern part of *Capricorn*. It is in perihelion on December 22d, and its distance from the Earth in millions of miles increases from 167, on November 1st, to 179, on December 1st, and 190, on December 31st. The diminution is not quite as rapid as it was during the early autumn, and it will keep on slowing up until the maximum is reached, in the spring of 1904. There will be a loss of about thirty per cent in brightness during the two

months, and *Mars* will no longer be conspicuous; but it will still be as bright as a small, first-magnitude star, and easily identified in the comparatively barren region in which it is moving.

Jupiter is in fine position for observation in the southern and southwestern sky in the evening. On November 1st it does not set until nearly 2 A.M., on December 1st at midnight, and on December 31st shortly after 10 P.M. It moves very slowly westward until November 9th, and then resumes its direct eastward motion. By the end of December it has moved 4° eastward and 2° northward. It is in the western part of the constellation *Pisces,* and very few naked-eye stars are near it. At the end of December the vernal equinox is about 10° east and 6° north of *Jupiter,* and the planet will pass near that point of the heavens in the spring of 1904.

Saturn is also in the southwestern sky in the evening, but much lower down than *Jupiter,* although it may be seen without difficulty in the evening sky until the end of December. On November 1st it sets at about 10:30 P.M., at 8:40 on December 1st, and at about 7 on December 31st, the last being rather more than two hours after sunset. It is in the constellation *Capricorn,* and its motion among the stars is 5° eastward and 1° northward. Toward the close of December it is in the neighborhood of *Mars,* and there will be an interesting conjunction of the two planets on the evening of December 20th. *Mars* will pass to the south of *Saturn* from west toward east, at a distance just a trifle more than the apparent diameter of the Moon. At the time of nearest approach, the Moon, about two days old, may be seen between the planets and the western horizon.

Uranus is low down in the southwestern sky on November evenings,—too low for so faint an object to be easily seen. It passes conjunction with the Sun on December 18th, and becomes a morning star. During November and December it moves about 3° eastward into the extreme western part of *Sagittarius.*

Neptune comes to opposition with the Sun early in the morning of December 27th.